
$^{14}\text{N}(\alpha,\text{p}), {}^4\text{He}(^{14}\text{N},\gamma{}^{17}\text{O}) \quad \textbf{1969Ro07,1969Ba17}$

- 1953He58: $^{14}\text{N}(\alpha,\text{p})$, E=1.5-3.5 MeV; measured products, ^{17}O , $E\alpha$, l_α ; deduced $\sigma(\theta)$.
- 1961Ya02: $^{14}\text{N}(\alpha,\text{p})$, E=26.8,28.1,33.3 MeV, measured angular distributions.
- 1967Be30: $^{14}\text{N}(\alpha,\text{ap})$, E=22.9 MeV; deduced nuclear properties.
- 1969Ba17: $^{14}\text{N}(\alpha,\text{ap})$, E=22.9 MeV; measured $\sigma(E_\alpha, E_p, \theta(\alpha))$. Natural target.
- 1969Ro07: $^{14}\text{N}(\alpha,\text{p})$, E=13-18 MeV; measured $\sigma(E; E_p, \theta)$ (absolute). ^{17}O deduced levels, J. Natural target.
- 1969Sc21: $^{14}\text{N}(\alpha,\text{p})$, E=7-12 MeV; measured $\sigma(\alpha,n)/\sigma(\alpha,p)$ ratio, $\sigma(E; E_\gamma, E_p, \theta(p))$.
- 1970Ze01: $^{14}\text{N}(\alpha,\text{p})$, E=10-25 MeV; measured $\sigma(E; E_p, \theta)$; deduced reaction mechanism. ^{17}O levels deduced configurations.
- 1974Sc09: $^{14}\text{N}(\alpha,\text{py})$, E=10 MeV; used Doppler-shift attenuation method (DSA) to deduce $T_{1/2}$ for 0.871 MeV state of ^{17}O .
- 1975Th01: $^{14}\text{N}(\alpha,\text{py})$, measured $\sigma(E_\gamma)$.
- 1987MiZY: $^{14}\text{N}(\alpha,\text{p})$, E=48 MeV; measured $\sigma(E_p)$. ^{17}O deduced levels.
- 1988BrZY: $^{14}\text{N}(\alpha,\text{p})$, E=48 MeV; measured not given. ^{17}O deduced levels, J, π .
- 1992Ar08: $^{14}\text{N}(\alpha,\text{p})$, E=5.2-7.5 MeV; measured $\sigma(\theta)$ vs E. Accurate nitrogen profile determination, TiN, NbTiN films, nitrogen implanted steel.
- 1994Gi14: $^{14}\text{N}(\alpha,\text{p})$, E=4-5 MeV; measured $\sigma(\theta)$ vs E; deduced elemental composition determination precision features.
- 1996Gi14: $^{14}\text{N}(\alpha,\text{p})$, E=3.9-5 MeV; measured products, ^{17}O , $E\alpha$, $I\alpha$; deduced $\sigma(\theta)$.
- 1999Xu07: $^{14}\text{N}(\alpha,\text{p})$, E=5.6-7.4 MeV; measured products, ^{17}O , $E\alpha$, $I\alpha$; deduced $\sigma(\theta)$.
- 2005De54: $^{14}\text{N}(\alpha,\text{p})$, E=4893-6047 keV; measured $\sigma(\theta=172^\circ)$.
- 2006We05: $^{14}\text{N}(\alpha,\text{p})$, E=3.2-4.0 MeV; measured σ .
- 2008Te09: $^{14}\text{N}(\alpha,\text{p})$, E=3.5-6 MeV; measured reaction products, $E\alpha$, $I\alpha$; deduced $\sigma(\theta)$, yields. Comparison with available data.
- 2017Ko31: ${}^4\text{He}(^{14}\text{N},\text{p})$, E=35.6 MeV; measured reaction products, $E\alpha$, $I\alpha$; deduced $\sigma(\theta)$.
- 2018Sm01: A beam of ^{14}N , delivered by the NSCL/ReA3 facility, impinged on a 10^{19} atom/cm² ${}^4\text{He}$ gas jet target at the JENSA facility. The scattered α particles and reaction protons, from $^{14}\text{N}(\alpha,\text{p})$ reactions, were momentum analyzed in the SuperORRUBA position sensitive Si barrel array. In addition, a set of 9 2"×2" LaBr₃(Ce) scintillator detectors from the HAGRID array were placed at $\theta_{\text{lab}} \approx 90^\circ$ and detected coincidence γ rays. A group of $E_\gamma \approx 871$ keV photons was observed in coincidence with the reaction protons.

Theory:

- 1962Ga16: Analysis of delayed coincidence lifetime measurements.
- 2014Ba35: $^{14}\text{N}(\alpha,\text{p})$, analyzed previous σ data by R-matrix. Comparison with previous experimental results, evaluated data, and theoretical calculations.
- 2015Vo02: $^{14}\text{N}(\alpha,\text{p})$, E=8.674 MeV; calculated reaction probability of nonthermal reaction, effective temperature of non-Maxwellian α particles from $^7\text{Li}(\text{p},\alpha)$ reaction. $^{14}\text{N}(\alpha,\text{p}){}^{17}\text{O}$; calculated forward (p,α) and reverse (α,p) reactivities. Impact on CNO cycles and ^{17}O abundance in standard solar model (SSM).
- 2017Ch32: $^{14}\text{N}(\alpha,\text{p})$, E not given; analyzed available data; deduced yields.
- 2017Vo11: $^{14}\text{N}(\alpha,\text{p})$, E<8.7 MeV; calculated probability and rate of suprathermal (α,p) reaction in the CNO cycle, comparative contribution of α particles from $^7\text{Li}(\text{p},\alpha)$, ${}^3\text{He}({}^3\text{He},\alpha)$ reactions and ${}^8\text{B}$ β^+ decay to ${}^8\text{Be}^*$ to 2 α . Impact on ^{17}O and ^{18}O abundances in the outer core region.

^{17}O Levels

$E(\text{level})^\dagger$	J^π	$T_{1/2}$	L	Comments
0			2	L: from (1961Ya02).
871		170 ps	7	Γ : from $\tau=245$ ps 10 (1974Sc09). See also $\tau=434$ ps 11 (1962Ga15, 1962Ga16). L: from (1961Ya02).
3058			1	L: from (1961Ya02).
3846			3	L: from (1961Ya02).
4555				
5083				
5217	(7/2,9/2,11/2)			J^π : from (1969Ro07) on the basis of a possible statistical compound nuclear mechanism and the (2J+1) rule.
5378				
5697				
5729				

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 $^{14}\text{N}(\alpha,\text{p})$, $^4\text{He}(^{14}\text{N},\gamma^{17}\text{O})$ **1969Ro07,1969Ba17 (continued)**

 ^{17}O Levels (continued)

E(level) [†]	Comments
5866	
5940	
6380	
6870	
6990	
7167	
7373	
7560	
8460 70	E(level): See also 8480 keV 50 (1967Be30 : doublet).
8880 70	E(level): See also 8910 keV 50 (1967Be30).
9140 70	E(level): See also 9170 keV 50 (1967Be30).
9790 70	E(level): See also 9840 keV 80 (1967Be30).
10660 70	E(level): See also 10700 keV 50 (1967Be30).
12000 70	E(level): See also 12050 keV 50 (1967Be30).
12430 70	
12740 70	
13.57×10 ³ 10	

[†] For $E_x \leq 7.6$ MeV: nominal level energy values listed and observed in ([1969Ro07](#)). For levels $E_x \geq 8.46$ MeV: from ([1969Ba17](#)): the sequential decay of $^{14}\text{N}(\alpha,\text{ap})^{13}\text{C}$ reaction appears to take place via a number of ^{17}O states which are believed to have $J \geq 5/2$, $\Gamma_a/\Gamma \geq 0.6$). For other observations or the angular distributions or the cross sections for the $^{14}\text{N}(\alpha,\text{p})$ reaction to many ^{17}O states have been studied in ([1953He58](#), [1961Ya02](#), [1970Ze01](#), [1996Gi14](#), [1999Xu07](#), [2005De54](#), [2006We05](#), [2008Te09](#), [2017Ko31](#)).

 $\gamma(^{17}\text{O})$

E_γ	$E_i(\text{level})$	E_f	Comments
870.7 2	871	0	E_γ : from (1975Th01). See also (1969Sc21 , 1974Sc09 , 2018Sm01).

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Level Scheme

